

A CASE FOR A RECORDABLE MEDIUM DISC**Technical Field**

The present invention relates to a case for a recordable medium disc.

5 The invention has been primarily developed for use with 5-inch Compact Discs (CDs) which are stored within various standard sized cases, known as Jewel cases, and will be described with reference to this application. CD's are common in audio, computer and audio visual applications. However, it will be appreciated
10 that the invention is not limited to this particular application and is also suitable for use with discs of smaller (eg. Minidiscs) and larger (eg. Laserdiscs) sizes.

Background to the Invention

15 Several different arrangements of CD cases and other CD cases are known that hold one or more CD discs.

 The most common form of CD case is the 10mm thick case (Jewel case) which has a base portion that locks into the bottom of the case. The base portion has an annular recess complimentary to the
20 CD and an inner cylindrical protuberance (hub) which is a circumferential interference or sprung fit with the central hole of the CD to retain the CD adjacent the base portion.

 Other known cases are 5mm thick jewel cases which comprise only a bottom and a lid; the bottom having moulded into it an
25 annular recess complimentary to the CD and an inner cylindrical protuberance which is an interference or sprung fit with the central hole of the CD to retain the CD.

A disadvantage of these known types of CD cases is gripping access to the disc is limited as the disc sits flush with the base portion which makes removal difficult. This problem of removal is even more difficult with the slimmer 5mm thick jewel cases.

5 Other known cases attempt to incorporate swing out or lift up base portions (trays) to improve access to the disc. The known forms of this type have various pivotal or moveable bottom trays that allow for upward movement of the disc for easier gripping. However these known types have the disadvantages of being
10 excessively complicated, problematic to manufacture and assemble and are mechanically unreliable.

 Additionally, common to the aforesaid known CD cases is the use of the afore described hub to releaseably attach the CD to the bottom portion or to a moveable tray of the case. The known hubs
15 exacerbate the difficulties of removing a CD from a CD case.

 Known hubs require a downward pressing force to attach the CD to the hub and upward pulling force to detach a CD. The circumferential interference or sprung fit of known hubs leave little tolerance for precise adjustment of the mechanical and
20 frictional forces exerted to retain the CD satisfactorily. More often than not known hubs fit much too tightly within the centre hole of the CD. This makes it difficult to remove a CD and causes bending of the CD across it's diameter. Bending the laminate structure of a CD is a common cause of micro delamination which
25 destroys the data storage structure and results in permanent failure of the CD. Advances in CD technology (increased data capacity, higher speeds, enhanced read/write capabilities etc.) is producing CD's with increasingly sophisticated laminate structures

which are increasingly susceptible to bending induced micro delamination and disc failure.

Known hubs also negate the advantage of known cases with moveable or lift up bottom portions (trays). Moveable portions are
5 by there very nature less rigidly located in space than cases where the known hubs are fixed to a rigid case bottom. Pulling a CD off a known hub causes the tray to flex or move forward in the direction of force frustrating it's removal; conversely pushing the CD down over the hub is even more problematic as the tray will
10 move or flex away from the CD.

Objectives of the Invention

It is the object of the present invention to substantially overcome or at least ameliorate the afore described disadvantages
15 of known forms; to provide a CD case that simply and reliably allows for the disc to be elevated clear of the case for ease of gripping and also provides for easy removal (and reattachment) from a hub when the tray is at the elevated access position.

20 Summary of the Invention

Accordingly, in one broad form of the invention there is provided a case for a recordable medium disc, comprising a case bottom, a case lid pivotally connected to the case bottom, and a pivotal tray for the disc; the pivotal tray mounted for pivotal
25 rotation from a first position substantially parallel to the case bottom, to a second position at an angle to the case bottom; and wherein the pivotal rotation is urged by pivotal rotation of the lid relative to the case bottom.

Preferably, the case bottom comprises a substantially planar bottom, and opposing short appendages providing pivot support side portions; and wherein the pivot support side portions extend outwardly beyond a rear edge of the planar bottom.

5 Preferably, the pivot support side portions provide first pivotal support elements for the case lid; the first pivotal support elements defining a first line of rotation for the case lid; the first line of rotation lying beyond the rear edge.

10 Preferably, the pivot support side portions provide second pivotal support elements for the pivotal tray; the second pivotal support elements defining a second line of rotation lying between the rear edge and the first line of rotation.

15 Preferably, the case lid comprises a substantially planar cover provided with opposing downwardly depending side portions and a downwardly depending rear portion having a side surface substantially normal to the planar cover portion and a lower edge; the lower edge of the rear portion forming a cam like portion relative to the second line of rotation.

20 Preferably, the side portions of the case lid are provided with case lid pivot elements for engagement with the first pivotal support elements so as to provide for pivotal rotation of the lid about the first line of rotation.

25 Preferably, the pivotal tray comprises a substantially planar component having a rear portion provided with pivotal tray pivot elements at each outer end of the rear portion, and a front portion; the rear portion extending adjacent the rear edge of the case bottom between the pivot support side portions of the case

bottom; and wherein the front portion extends to the middle of the case bottom.

Preferably, the pivotal tray pivot elements engage with the second pivotal support elements so as to provide for pivotal
5 rotation of the pivotal tray about the second line of rotation.

Preferably, the rear portion of the pivotal tray is provided with at least one extension portion; said extension portion a continuation of the substantially planar component and projecting beyond the second line of rotation to abut the cam like portion.

10 Preferably, rotation of the case lid from a first closed position substantially parallel with the case bottom, to an open position at an angle to the case bottom causes the cam like portion to depress the extension portion so as to rotate the pivotal tray from the first position parallel to the case bottom,
15 to an angle relative to the case bottom proportional to the angle of the case lid.

Preferably, rotation of the case lid reaches a first detent angle at which the side surface substantially normal to the substantially planar cover of the case lid is in parallel contact
20 with the extension portion so as to provide a releasable stop position retaining the case lid and the pivotal tray in a stable configuration.

Preferably, the pivotal tray is provided with an approximately cylindrical protuberance from an upper surface of
25 the pivotal tray; the cylindrical protuberance divided into a front portion and a rear portion; the front portion and rear portion arranged for releasable engagement with a central aperture of the disc.

Preferably, each of the rear portion and front portion is separately and resiliently attached to the pivotal tray.

Preferably, each of the rear portion and the front portion approximate one half of an inverted frustum so as to each present
5 an undercut outer face; the rear portion and the front portion separated by a gap; and wherein the rear portion and the front portion projecting above the upper surface of the pivotal tray sufficient to project through the aperture of the disc.

The case of claim 14 wherein the diameter of the base of the
10 frustum is slightly larger than the diameter of the central aperture of the disc.

Preferably, the rear portion and the front portion are reduced in width adjacent the gap so that the width is slightly less than the diameter of the central aperture of the disc.

15 Preferably, the rear portion and the front portion are disposed in a circular aperture within the pivotal tray; the diameter of the circular aperture larger than the diameter of the frustum; and wherein each of the rear portion and the front portion is connected to the periphery of the circular aperture by
20 a pair of flexible lugs.

In a further broad form of the invention there is provided a hub for releasably engaging a central aperture of at least one recordable medium disc; the hub comprising a projection from an upper surface of a disc tray; the projection including a rear
25 portion and a front portion separated by a transverse gap.

Preferably, the projection is sufficient to pass through the central aperture of the at least one recordable medium disc and

extend above an upper surface of the, or the uppermost disc when the at least one disc is seated on the disc tray.

Preferably, the projection approximates an inverted frustum of an oval based cone; a major axis of the oval based cone
5 disposed at right angles to the gap; and wherein the frustum provides undercut outward facing surfaces of the rear portion and front portion.

Preferably, the major axis of the oval based cone is slightly larger than the diameter of the central aperture.

10 Preferably, a minor axis of the oval based cone is slightly smaller than the diameter of the central aperture.

Preferably, the rear portion and the front portion are disposed in a circular aperture within the disc tray; the diameter of the circular aperture larger than the major axis of the oval
15 based cone; and wherein each of the rear portion and the front portion is resiliently connected to the periphery of the circular aperture by a pair of flexible lugs.

Preferably, the pair of flexible lugs of the rear portion and of the front portion are disposed along a line parallel to the
20 gap.

Preferably, the pair of flexible lugs of the rear portions and of the front portion are and connected to the rear portion and to the front portion adjacent to the gap.

Preferably, the at least one recordable medium disc may be
25 engaged with the hub by application of a portion of an inner edge of the central aperture to the undercut outward facing surfaces of the rear portion or the front portion, so as to cause deflection of the front portion or the rear portion respectively, inwards

towards the gap thereby reducing the major axis to equal to or less than the diameter of the central aperture.

Preferably, the at least one disc may be disengaged from the hub by the application of vertically upward pressure on the disc, so as to force engagement between the central aperture and the undercut outwardly facing surfaces, to reduce the major axis sufficient for the central aperture of the disc to disengage from the hub.

Preferably, the disc tray is pivotally attached to a bottom portion of a disc case so as to permit rotation between a first position substantially parallel to the bottom portion and a second position at an angle to the bottom portion.

Preferably, the disc case is provided with a pivotally connected lid.

Preferably, pivotal rotation of the lid is arranged to apply pivotal rotation to the disc tray.

Accordingly, the present invention provides a case for a recordable medium disc, the case including:

a case bottom;

a disc tray adapted for pivotal movement or integrally formed for pivotal movement with the case bottom and adapted to releasably retain a disc adjacent thereto and having pivotal means and a rear projection, the disc tray adapted for movement relative to the case bottom between a storage position substantially parallel and adjacent to the bottom and an access position angled with respect to the bottom;

a lid having a cam like projection and adapted mounted for movement with respect to the case bottom between a closed position

substantially parallel and adjacent to the bottom and an open position angled with respect to the bottom;

whereby, when the lid is in the closed position, the cam like extension of the lid and the disc tray are in an engaged abutting relationship and initial movement of the lid towards the open position depresses the rear projection of the disc tray and moves the disc tray to the access position at which continued movement of the lid causes an area on the cam like extension of the lid to abut an area of the rear projection of the disc tray to effect a positive but releasable stop position which retains the lid in the open position and the disc tray in the elevated access position and where continued movement of the lid will retain the disc tray in an elevated access position,

and when the lid is in the open position, movement of the lid through to the closed position

returns the lid and the disc tray to closed positions respectively.

Preferably the disc tray desirably includes a hub like protrusion to releasably retain a disc adjacent thereto, said hub being formed to engage the central hole of a CD disc and includes:

a front portion, resiliently sprung and having an undercut on its forward facing edge such that will accommodate a little more than CD disc thickness;

a rear portion, resiliently sprung and having a vertical or an undercut rearward facing edge such that will accommodate a little more than a CD disc thickness;

wherein the front and back portions are diametrically opposed at a distance a little more than the diameter of a CD disc central

hole and their side to side dimension a little less than a CD disc hole diameter,

whereby, when disc is pressed vertically over the hub at least the front resiliently sprung portion will flex inward to
5 allow the hub to pass through the hole to become securely releasably engaged by the undercut, but such that light lifting force will effect disengagement, and

whereby a disc may also be engaged with the hub by moving the disc toward the hub in a dive bombing like action to cause the
10 inner edge of the hole to abut and press against the undercut edge of either the front or back resiliently sprung portion to cause it to flex in the direction of movement decreasing the hub diameter to allow the disc hole edge to slide down the undercut face to pass over the hub to become releasably engaged;

15 and wherefrom a lightly forced reverse dive bombing action will deflect the resiliently sprung portion of the hub in the direction of movement to decrease the diameter of the hub whilst flexing the contacted portion such that its edge is rotated beyond parallel to the central axis of the hub such that the edge of the
20 disc hole may slide up to become free of the hub.

A preferred form of the invention

In a preferred form of the invention a case bottom is moulded in rigid but resilient plastic and forms a shallow open top
25 container to accept a disc, said case bottom includes;

an integral pivotal base portion;

comprising a front tray portion adapted to support a disc and having on it's upper surface a cylindrical protuberance sized to

releasable engage with the centre hole the of a CD to retain the
CD adjacent to the pivotal base portion and having a shorter
opposite reward facing portion. The pivotal base portion is
substantially planar and is integrally connected to the case
5 bottom at it's sides toward the rear of the tray portion through a
pair of short axially aligned beams having cross sections which
allow torsion so that a downward force applied to the rear portion
results in the upward movement of the tray portion;

and having a lid;

10 a lid pivotally is mounted at its sides toward the rear of
the case bottom such that a short reward cam like portion of the
lid bottom extends beyond the pivot point and is caused to abut
and depress the rearward portion of the base when the lid is
opened to elevate the tray portion for easy grasping of the CD.
15 Conversely, when the lid is pivoted back to the close position the
short rearward portion of the base is allowed to resiliently
return to it's rest position returning the tray portion (with
attached disc) back to it's former position substantially flush
within the closed case,

20 and having a protuberance;

a protuberance a protuberance which is an interference or
sprung fit with the central hole of the CD disc; said protuberance
having a resiliently mounted front portion with an undercut front
face and a resiliently mounted rear portion having a vertical or
25 undercut rear face and being sized such that the front to back
diameter of the protrusion is a little greater than the diameter
of a CD disc centre hole and the side to side diameter is a little
less than the diameter of as CD disc hole, such that CD disc hole

may be lightly force over the protrusion to become releasably engaged at the front and back undercut area; and whereby a disc may be loaded onto the protrusion by pressing the disc centre hole down over the protrusion or by pressing the disc hole in a front to back movement over the protuberance.

A second embodiment of the invention

In another form of the invention the pivotal portion of the base is a separate piece; having a forward tray portion adapted to retain a disc and a short rearward portion adapted to co act with the lid and in the manner of the first embodiment described. However, in this second embodiment the pivotal movement of the pivotal base portion within the case base is effected by means of a pair of opposite outward facing spigots located at the sides of the pivotal base portion toward its rear, said spigots engage within reciprocal open top channels sections which are resiliently biased at the top edges of their walls to accept forceful entry of the spigots which become pivotally captured in the wider bottom area of the channels.

Brief Description of Drawings

Preferred embodiments of the invention will now be described, by way of examples only, with reference to the accompanying drawings in which;

Figure 1 is a perspective view of a CD case according to a first embodiment of the invention showing the case lid open and the tray being elevated

Figure 2 is a top view of the CD case of Figure 1 showing the case closed and the CD and lid shown in phantom line.

Figure 3 is a partial section view of Figure 2.

Figure 4 is a partial section view of Figure 2 showing the lid partially opened and the tray elevated.

Figure 5 is a partial section view of Figure 2 showing the lid at the stop position holding the tray at the access position.

Figure 6 is a partial section view of Figure 2 showing the lid opened through 180°

Figure 7 is a partial perspective view of a top tray showing a cylindrical protuberance for releasable attachment of a CD

Figure 8 is a partial top view of the tray of Figure 1 and 2 showing a cylindrical protuberance for releasable attachment of a CD

Figure 9 is a section view of Figure 7

Figure 10 is a top view of a second embodiment of the invention shown with the case closed and a CD and lid shown in phantom line.

Figure 11 is a partial section view of Figure 9

Figure 12 is a top view of a third embodiment of the invention shown with the case closed and a CD and lid shown in phantom line.

Figure 13 is a partial section view of Figure 11

Detailed Description of Preferred Embodiment

Figures 1 to 6 show a first embodiment 100 according to the present invention which includes a case bottom 10 having an integral pivotal tray 20, comprising a tray front portion 21 and

a tray rear portion 22 and a lid 30 pivotally mounted at the rear of the case bottom 10.

As best shown in Figures 7 and 8 and 9, the tray front 22 has on its top surface a short cylindrical protuberance 23 having a resiliently flexible front portion 24 with an undercut outer front face 26 and having a resiliently flexible rear portion 25 with an undercut outer rearward facing face 27. The protuberance is centrally disposed in a hole in the tray front and each front and rear portions is supported by a pair of resilient lugs connecting the portions to the periphery of the hole and parallel to a gap between the portions. Said cylindrical protuberance having a front to back diameter a little more than a CD disc hole diameter and a side to side diameter a little less than a CD disc hole diameter.

The case bottom 10 is substantially planer with short walls to increase rigidity. The rear of the case bottom 10 has a pair of short appendages 11 extending rearward at each side having an apposed pair of short inward facing spigots 12 to engage reciprocal holes 31 in each side of the rear of the lid 30 to effect a hinge point 12, 31 for the lid 30.

The tray 20 is connected to the case bottom 10 near its outer edges toward its rear by a pair of short axially aligned torsion members 28. The tray rear 22 extends below and rearward past the case bottom and lid pivot point 12, 31.

The lid 30 includes a short rearward cam like extension 32 extending past the hinge pivot point 12, 31.

The operation of this preferred form of the invention will now be described. As shown in Figures 1 and 2, a disc 40 is contained substantially flush with the case bottom 10 within the

case 100 when the lid 30 is closed. When the lid 30 is opened the rearward cam like extension 32 depresses the tray rear 22 and elevates the tray front 21. As best shown in figures 1 and 5, when the lid 30 is rotated through approximately 110° the flat rear facet 33 of the cam like extension 32 comes into parallel contact with the upper surface of the tray rear 22 and effects a lid stop to prevent the lid from snapping closed and to hold the tray 20 in the elevated access position. Continued rotation of the lid 30 through its full travel of 180° brings the upper rear surface of the lid into parallel contact with the upper surface of the tray rear 22. Closure of the lid 30 effects the return of the tray 20 and disc 40 to a substantially flush position within the case bottom 10.

15 **A second embodiment**

Figures 10 and 11 show a second embodiment 200 in accordance with the invention which is similar to case 100 and like reference numerals have been used to indicate like features. However in the case 200 the pivotal tray 220 includes a pair of outward facing spigots 223 which are captured in a reciprocal pair of holes 211 formed into resiliently biased appendages 212 projecting from the rear of the case base 210. The invention otherwise being in accord with embodiment 100.

25 **A third embodiment**

Figures 12 and 13 show a third embodiment 300 in accordance with the invention which is similar to cases 100 and 200 and like reference numerals have been used to indicate like features.

However in the case 300 the pivotal tray 320 includes a pair of outward facing spigots 323 which are captured in a reciprocal pair of slots 311 formed into the side walls 312, each slot 311 has resiliently biased side walls 313 position a distance apart less
5 than the diameter of the spigots 323 such that the spigots when forced pass the top entry way of the slots 311 become permanently captured for pivotal movement at the bottom of the slot. The invention otherwise being in accord with embodiments 100 and 200.

Although the above description and the drawings have made
10 reference to a disc case and hub for carrying a single disc, it will be appreciated that for a disc case dimensionally equivalent to a standard 10mm case, the hub may be extended in length so as to accommodate thereon at least two discs.